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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/575,853	04/14/2006	Masato Yamada	136147	5143
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WILSON, SCOTT R				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/575,853

**Applicant(s)**

YAMADA ET AL.

**Examiner**

SCOTT R. WILSON

**Art Unit**

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 06 February 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SF/88)  
Paper No(s)/Mail Date 4/14/06, 3/30/07
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

The rejection mailed 4 April 2008 did not incorporate the Preliminary Amendment filed 14 April 2006, listing claim 1-18 as pending claims. Therefore, the rejection has been withdrawn. However, upon further consideration, new ground(s) of rejection are made in view of the consideration of pending claims 1-18.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1 and 3-5 are rejected under 35 U.S.C. 102(b) as being anticipated by Shakuda et al. (US 6,107,648 A). As to claim 1, Shakuda et al., Figure 1(a), discloses a light emitting device comprising: a light emitting layer portion (11)(col. 5, lines 30-32) composed of a III-V compound semiconductor; and a transparent thick-film semiconductor layer (7) having a thickness of 10  $\mu\text{m}$  or more (col. 6, line 60), formed on at least one main surface of the light emitting layer portion, and composed of a III-V compound semiconductor, embodied as GaP, having a band gap energy larger than a light quantum energy equivalent to a peak wavelength of emission flux from the light emitting layer portion (col. 7, lines 25-26), the transparent thick-film semiconductor layer has the side face portions (col. 9, lines 50-52) configured as chemically-etched surfaces, and has a doping-controlled region having a controlled dopant concentration of  $5 \times 10^{16}/\text{cm}^3$  to  $2 \times 10^{18}/\text{cm}^3$ , both ends inclusive (col. 6, lines 59-60), formed therein to a thickness of 10  $\mu\text{m}$  or more.

As to claim 3, Shakuda et al., Figure 1(a), discloses that the light emitting layer portion (11), considered as having one of two main surfaces thereof as a first main surface, has a main light extraction surface (3) formed on the first main surface side thereof, a light-extraction-surface-side metal electrode

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(9) is disposed on the main light extraction surface so as to cover a part of thereof, and on the other hand, the transparent thick-film semiconductor layer (7) is provided only on the second main surface side of the light emitting layer portion.

As to claim 4, Shakuda et al., Figure 1(a), discloses that the transparent thick film semiconductor layer (7) is disposed on the first main surface side of the light emitting layer portion (11), and assuming the first main surface of the transparent-thick-film semiconductor layer as the main light extraction surface, the light-extraction-surface-side metal electrode (8) is disposed so as to cover a part thereof.

As to claim 5, Shakuda et al., Figure 1(a), discloses that a metal reflective layer (9) is disposed on the second main surface side of the light emitting layer portion.

As to claim 6, Shakuda et al., Figure 1(a), discloses that a first transparent thick-film semiconductor layer (1) is provided on the first main surface side of the light emitting layer portion (11), and a second transparent thick-film semiconductor layer (7) on the second main surface side thereof, respectively as the transparent thick-film semiconductor layer.

As to claim 7, Shakuda et al., Figure 1(b), discloses that the light emitting layer portion (6) has a double heterostructure composed of AlGaInP, and the transparent thick-film semiconductor layer (7) is composed of any one of GaP.

As to claim 8, claim 8 is a **product-by-process claim**:

Note that a "product by process" claim is directed to the product per se, no matter how actually made, *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See also *In re Thorpe*, 227 USPQ 964, 966; *In re Luck*, 177 USPQ 523; *In re Fessmann*, 180 USPQ 324; *In re Avery*, 186 USPQ 161; *In re Wertheim*, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); and *In re Marosi et al.*, 218 USPQ 289, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that applicant has the burden of proof in such cases, as the above case law makes clear. See also MPEP 2113.

Claim 8 does not distinguish over Shakuda et al. regardless of the process used to form the transparent thick-film semiconductor layer, because only the final product is relevant, and not the process of making such as *by epitaxially growth by the hydride vapor phase epitaxial growth method*.

As to claim 9, Shakuda et al., Figure 1(a) discloses (col. 5, lines 33-34) that the transparent thick-film semiconductor layer (7) is a single-crystal substrate composed of a III-V compound semiconductor, bonded to the light emitting layer portion.

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Claim 10 is rejected under 35 U.S.C. 102(b) as being anticipated by Shakuda et al.. Shakuda et al., Figure 1(a), discloses a method of fabricating a light emitting device comprising: fabricating a wafer which comprises a light emitting layer portion (11)(col. 5, lines 30-32) composed of a III-V compound semiconductor; and a transparent thick-film semiconductor layer (7) having a thickness of 10  $\mu\text{m}$  or more (col. 6, line 60), formed on at least one main surface of the light emitting layer portion, and composed of a III-V compound semiconductor, embodied as GaP, having a band gap energy larger than a light quantum energy equivalent to a peak wavelength of emission flux from the light emitting layer portion (col. 7, lines 25-26); and dicing the wafer to divide it into the individual device chips; also forming, in the transparent thick-film semiconductor layer, a doping-controlled region having a controlled dopant concentration of  $5 \times 10^{16}/\text{cm}^3$  to  $2 \times 10^{18}/\text{cm}^3$ , both ends inclusive (col. 6, lines 59-60), to a thickness of 10  $\mu\text{m}$  or more, and removing a process-damaged layer, formed on the side face portions of the transparent thick-film semiconductor layer, by chemical etching after the dicing.

As to claim 12, Shakuda et al., Figure 1(a), discloses that the light emitting layer portion (11), considered as having one of two main surfaces thereof as a first main surface, has a main light extraction surface (3) formed on the first main surface side thereof, a light-extraction-surface-side metal electrode (9) is disposed on the main light extraction surface so as to cover a part of thereof, and on the other hand, the transparent thick-film semiconductor layer (7) is provided only on the second main surface side of the light emitting layer portion.

As to claim 13, Shakuda et al., Figure 1(a), discloses that the transparent thick film semiconductor layer (7) is disposed on the first main surface side of the light emitting layer portion (11), and assuming the first main surface of the transparent-thick-film semiconductor layer as the main light extraction surface, the light-extraction-surface-side metal electrode (8) is disposed so as to cover a part thereof.

As to claim 14, Shakuda et al., Figure 1(a), discloses that a metal reflective layer (9) is disposed on the second main surface side of the light emitting layer portion.

As to claim 15, Shakuda et al., Figure 1(a), discloses that a first transparent thick-film semiconductor layer (1) is provided on the first main surface side of the light emitting layer portion (11),

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and a second transparent thick-film semiconductor layer (7) on the second main surface side thereof, respectively as the transparent thick-film semiconductor layer.

As to claim 16, Shakuda et al., Figure 1(b), discloses that the light emitting layer portion (6) has a double heterostructure composed of AlGaInP, and the transparent thick-film semiconductor layer (7) is composed of any one of GaP.

As to claim 17, claim 17 is a **product-by-process claim**. Claim 17 does not distinguish over Shakuda et al. regardless of the process used to form the transparent thick-film semiconductor layer, because only the final product is relevant, and not the process of making such as *by epitaxially growth by the hydride vapor phase epitaxial growth method*.

As to claim 18, Shakuda et al., Figure 1(a) discloses (col. 5, lines 33-34) that the transparent thick-film semiconductor layer (7) is a single-crystal substrate composed of a III-V compound semiconductor, bonded to the light emitting layer portion.

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shakuda et al. in view of Huang et al.. Shakuda et al., Figure 1(a), discloses the device of claim 1, as described above. Shakuda et al. does not disclose expressly the thickness of the transparent thick-film layer to be 40  $\mu\text{m}$  or greater. Huang et al., Abstract, discloses an AlGaInP light emitting diode structure with a GaP window layer formed to have thickness of 45  $\mu\text{m}$ . At the time of invention, it would have been obvious to a person of ordinary skill in the art to form the GaP window layer of Shakuda et al. as thick as 40  $\mu\text{m}$ . The motivation for doing so would have been to increase the efficiency of the LED (Huang et al., Abstract). Therefore, it

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would have been obvious to combine Huang et al. with Shakuda et al. to obtain the invention as specified in claim 2.

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shakuda et al. in view of Kuhn-Kuhnenfeld et al. (US 4,100,014). Shakuda et al., Figure 1(a), discloses the device of claim 10, as described above. Shakuda et al. does not disclose expressly that an aqueous sulfuric acid/hydrogen peroxide solution is used as an etchant of the chemical etching. Kuhn-Kuhnenfeld et al. discloses (col. 2, lines 26-28) that an aqueous sulfuric acid/hydrogen peroxide solution can be used as an etchant for a GaP layer. At the time of invention, it would have been obvious to a person of ordinary skill in the art to etch the GaP process-damaged layer of Shakuda et al. with an aqueous sulfuric acid/hydrogen peroxide solution, as in Kuhn-Kuhnenfeld et al.. The motivation for doing so would have been to smooth the process-damaged layers for further processing. Therefore, it would have been obvious to combine Kuhn-Kuhnenfeld et al. with Shakuda et al. to obtain the invention as specified in claim 11.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott R. Wilson whose telephone number is 571-272-1925. The examiner can normally be reached on M-F 8:30 - 4:30 Eastern.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sue Purvis can be reached on 571-272-1236. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

srw  
July 21, 2008

/A. Sefer/  
Primary Examiner  
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